FIG. 1

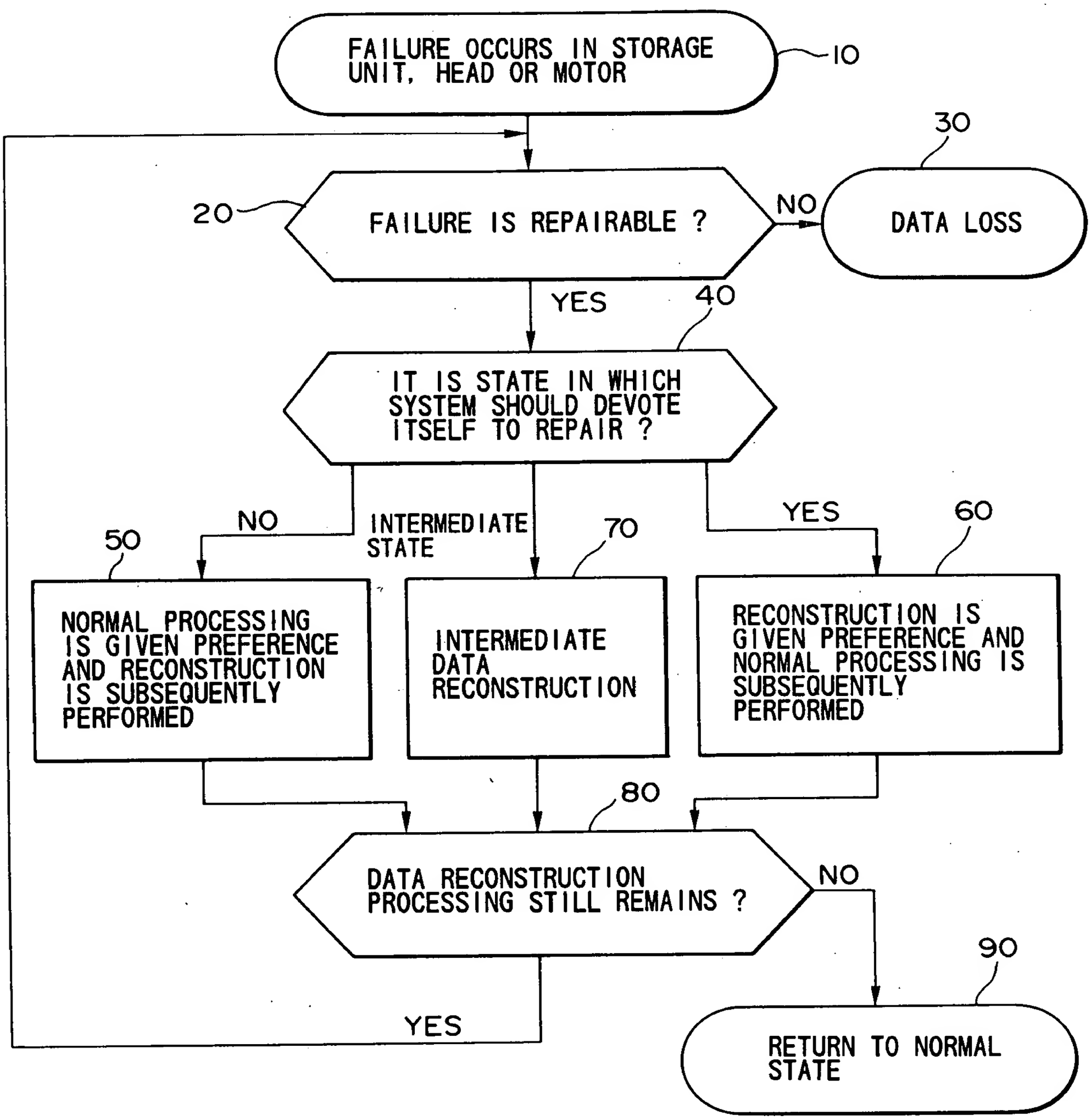

FAILURE OCCURS IN STORAGE UNIT, HEAD OR MOTOR
10
20
FAILURE IS REPAIRABLE ?
NO
30
DATA LOSS
YES
40
IT IS STATE IN WHICH SYSTEM SHOULD DEVOTE ITSELF TO REPAIR ?
NO
50
INTERMEDIATE STATE
70
YES
60
NORMAL PROCESSING IS GIVEN PREFERENCE AND RECONSTRUCTION IS SUBSEQUENTLY PERFORMED
INTERMEDIATE DATA RECONSTRUCTION
RECONSTRUCTION IS GIVEN PREFERENCE AND NORMAL PROCESSING IS SUBSEQUENTLY PERFORMED
80
DATA RECONSTRUCTION PROCESSING STILL REMAINS ?
NO
90
YES
RETURN TO NORMAL STATE

FIG.2

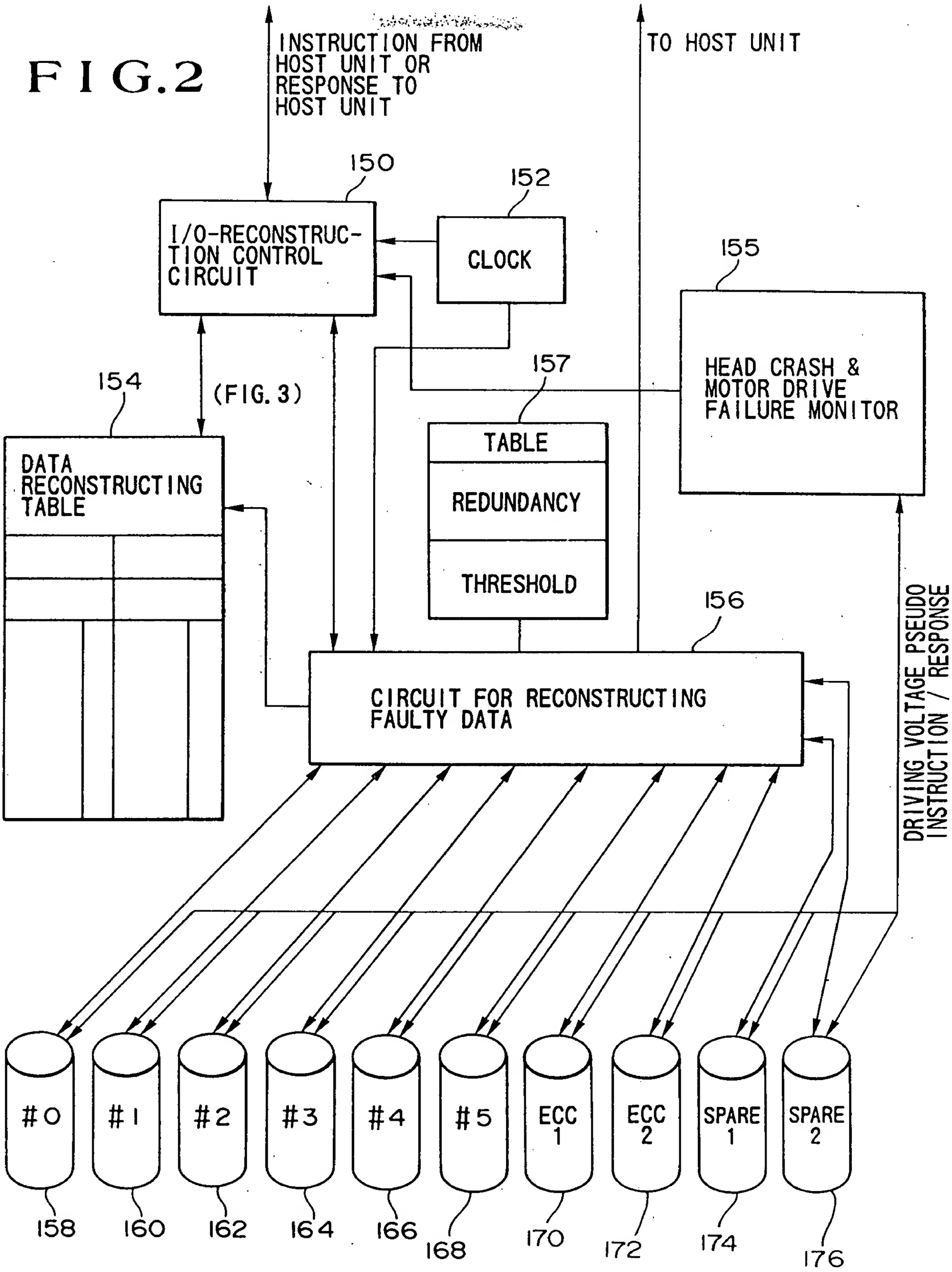

INSTRUCTION FROM HOST UNIT OR RESPONSE TO HOST UNIT
TO HOST UNIT
150
I/O-RECONSTRUC-TION CONTROL CIRCUIT
152
CLOCK
155
HEAD CRASH & MOTOR DRIVE FAILURE MONITOR
154
(FIG. 3)
157
TABLE
REDUNDANCY
THRESHOLD
DATA RECONSTRUCTING TABLE
156
CIRCUIT FOR RECONSTRUCTING FAULTY DATA
DRIVING VOLTAGE PSEUDO INSTRUCTION / RESPONSE
#0
#1
#2
#3
#4
#5
ECC 1
ECC 2
SPARE 1
SPARE 2
158
160
162
164
166
168
170
172
174
176

FIG.3

154

DATA RECONSTRUCTING TABLE

| | | | | |
|---|---|---|---|---|
| 1 | SPARE STORAGE UNIT SPARE 1 | | SPARE STORAGE UNIT SPARE 2 | |
| 2 | STORAGE UNIT AT FAILURE #2 | | STORAGE UNIT AT FAILURE #4 | |
| 3 | POINT OF FAILURE | | POINT OF FAILURE | |
| 4 | FAILURE SECTOR OR ADDRESS | RECONSTRUCTION JUDGEMENT FLAG | FAILURE SECTOR OR ADDRESS | RECONSTRUCTION JUDGEMENT FLAG 5 |
| | 0000 | 1 | 0000 | 1 |
| | 0001 | 1 | 0001 | 1 |
| | 0010 | 1 | 0010 | 0 |
| | ⌇ | | ⌇ | |
| | FFFF | 0 | FFFF | 0 |

FIG.4

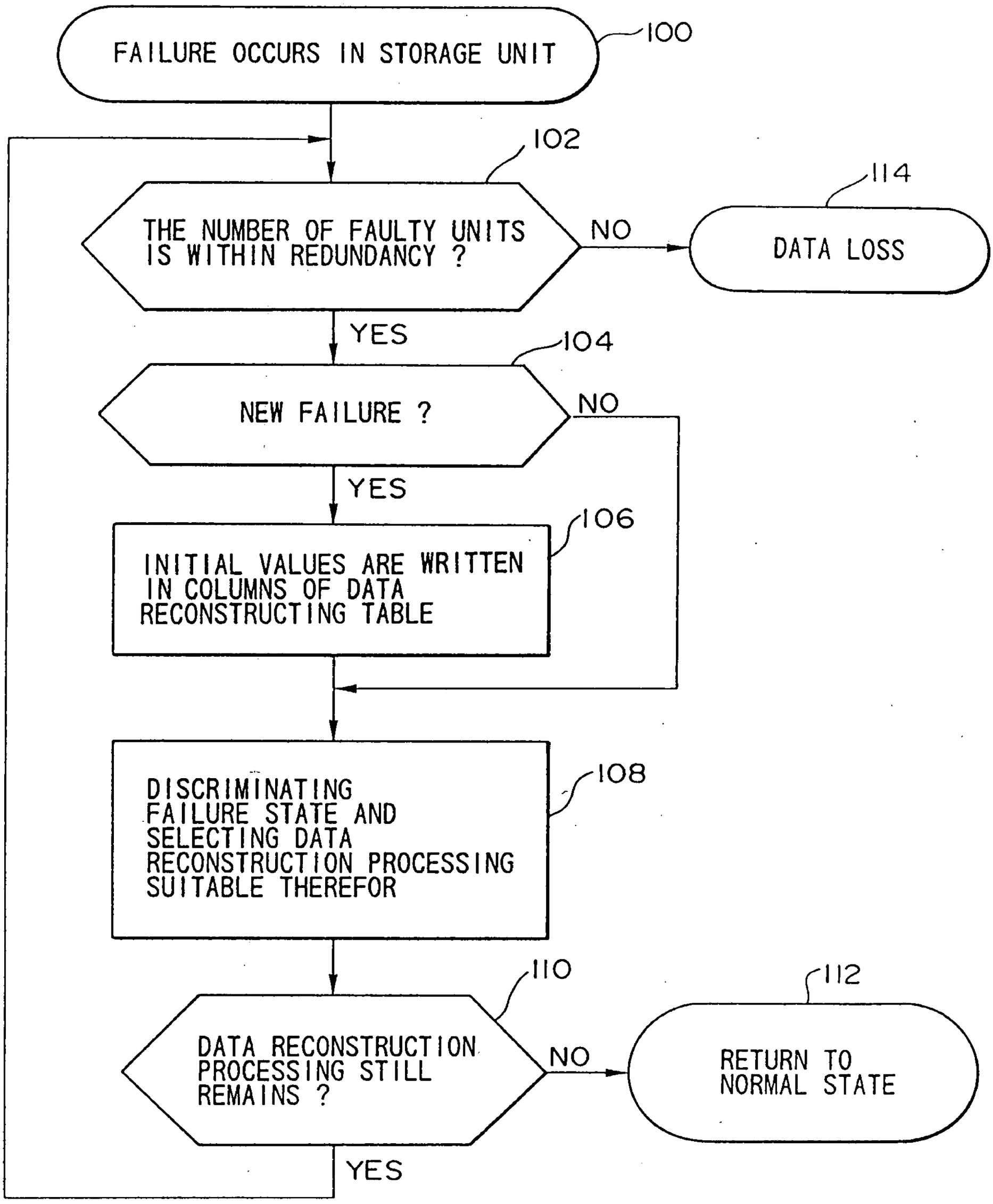

FAILURE OCCURS IN STORAGE UNIT
100
102
THE NUMBER OF FAULTY UNITS IS WITHIN REDUNDANCY ?
NO
114
DATA LOSS
YES
104
NEW FAILURE ?
NO
YES
106
INITIAL VALUES ARE WRITTEN IN COLUMNS OF DATA RECONSTRUCTING TABLE
108
DISCRIMINATING FAILURE STATE AND SELECTING DATA RECONSTRUCTION PROCESSING SUITABLE THEREFOR
110
DATA RECONSTRUCTION PROCESSING STILL REMAINS ?
NO
112
RETURN TO NORMAL STATE
YES

FIG.5

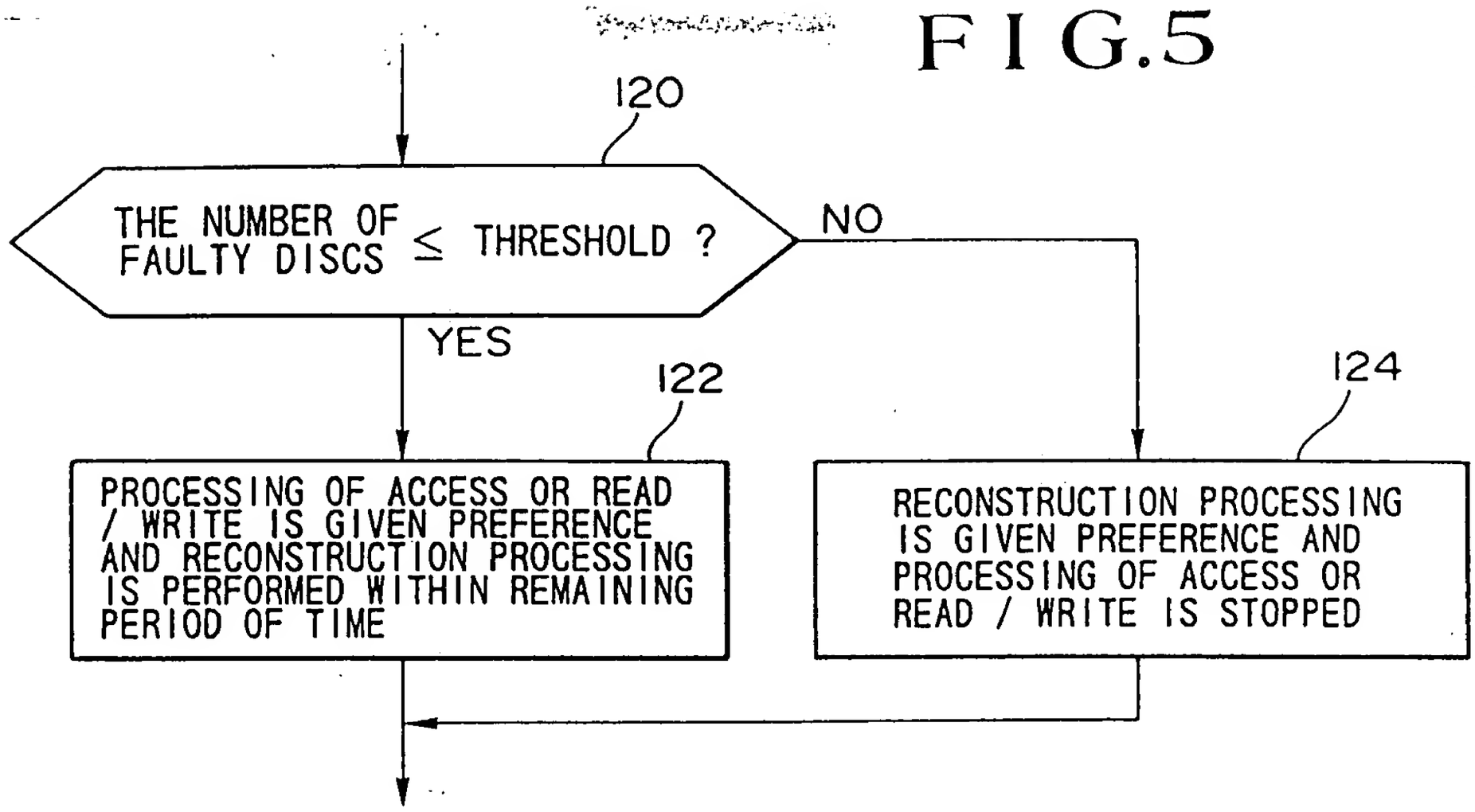

120
THE NUMBER OF FAULTY DISCS ≤ THRESHOLD ?
NO
YES
122
PROCESSING OF ACCESS OR READ / WRITE IS GIVEN PREFERENCE AND RECONSTRUCTION PROCESSING IS PERFORMED WITHIN REMAINING PERIOD OF TIME
124
RECONSTRUCTION PROCESSING IS GIVEN PREFERENCE AND PROCESSING OF ACCESS OR READ / WRITE IS STOPPED

FIG.6

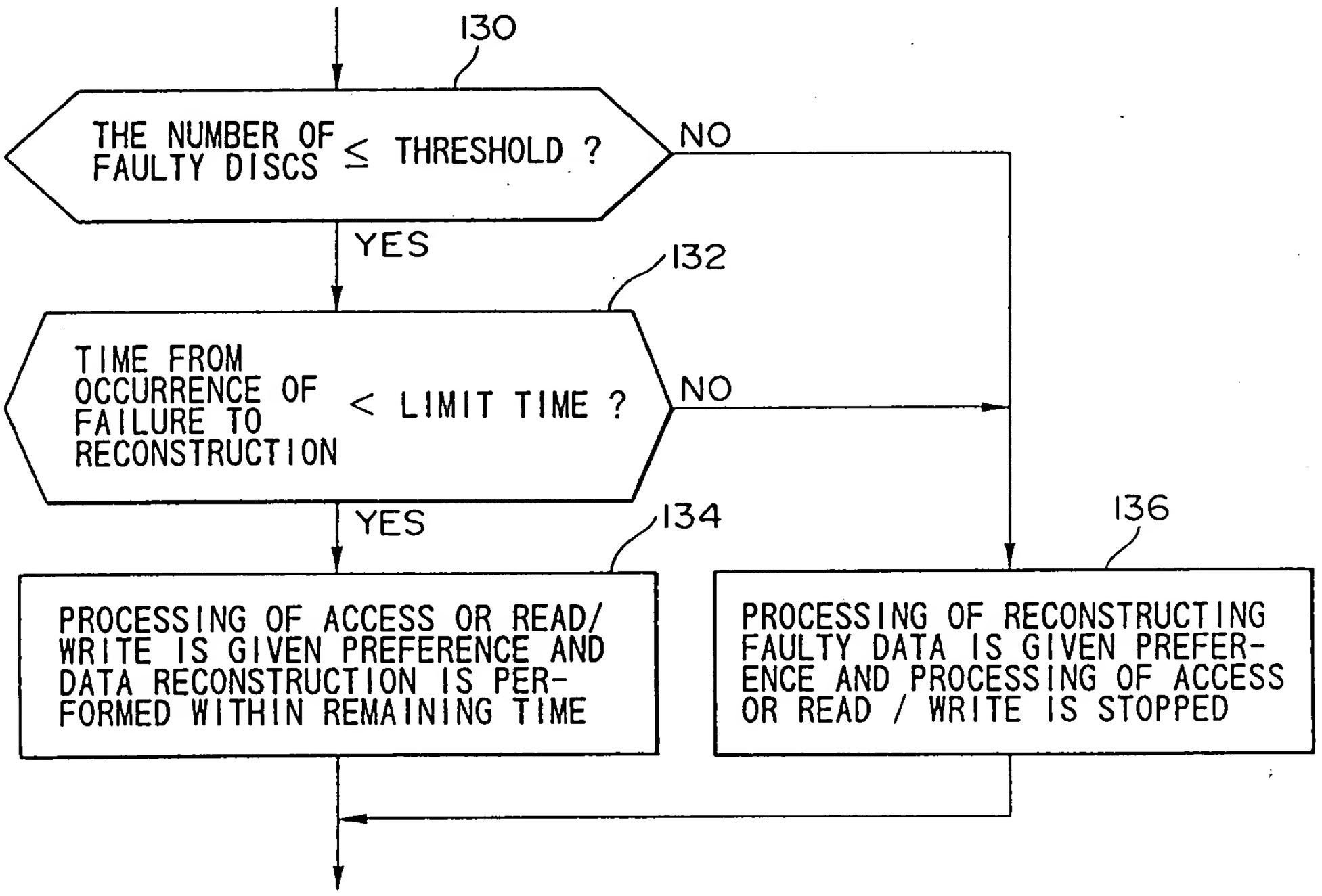

130
THE NUMBER OF FAULTY DISCS ≤ THRESHOLD ?
NO
YES
132
TIME FROM OCCURRENCE OF FAILURE TO RECONSTRUCTION < LIMIT TIME ?
NO
YES
134
PROCESSING OF ACCESS OR READ/ WRITE IS GIVEN PREFERENCE AND DATA RECONSTRUCTION IS PERFORMED WITHIN REMAINING TIME
136
PROCESSING OF RECONSTRUCTING FAULTY DATA IS GIVEN PREFERENCE AND PROCESSING OF ACCESS OR READ / WRITE IS STOPPED

FIG.7

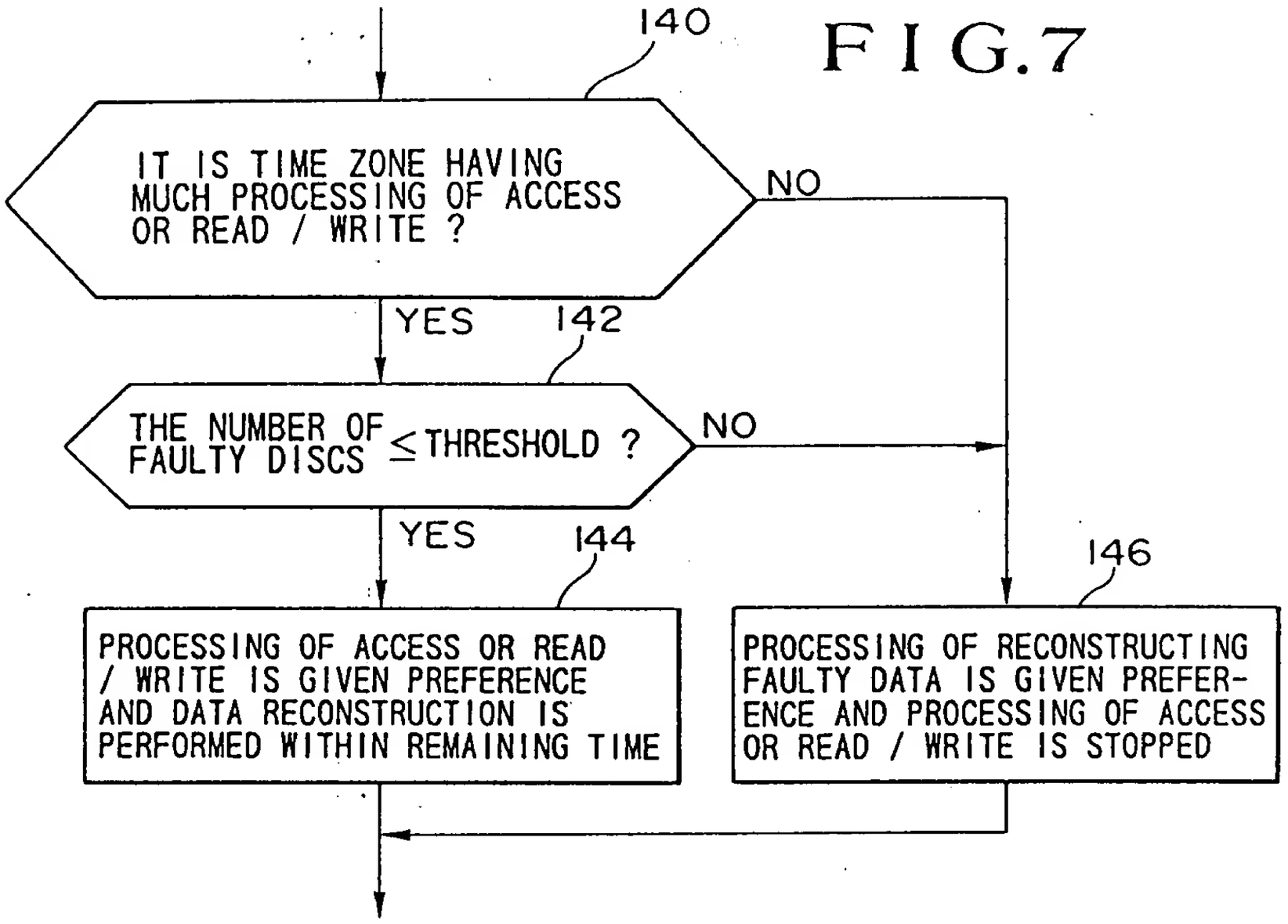

140
IT IS TIME ZONE HAVING MUCH PROCESSING OF ACCESS OR READ / WRITE ?
NO
YES
142
THE NUMBER OF FAULTY DISCS ≤ THRESHOLD ?
NO
YES
144
PROCESSING OF ACCESS OR READ / WRITE IS GIVEN PREFERENCE AND DATA RECONSTRUCTION IS PERFORMED WITHIN REMAINING TIME
146
PROCESSING OF RECONSTRUCTING FAULTY DATA IS GIVEN PREFERENCE AND PROCESSING OF ACCESS OR READ / WRITE IS STOPPED

FIG.8

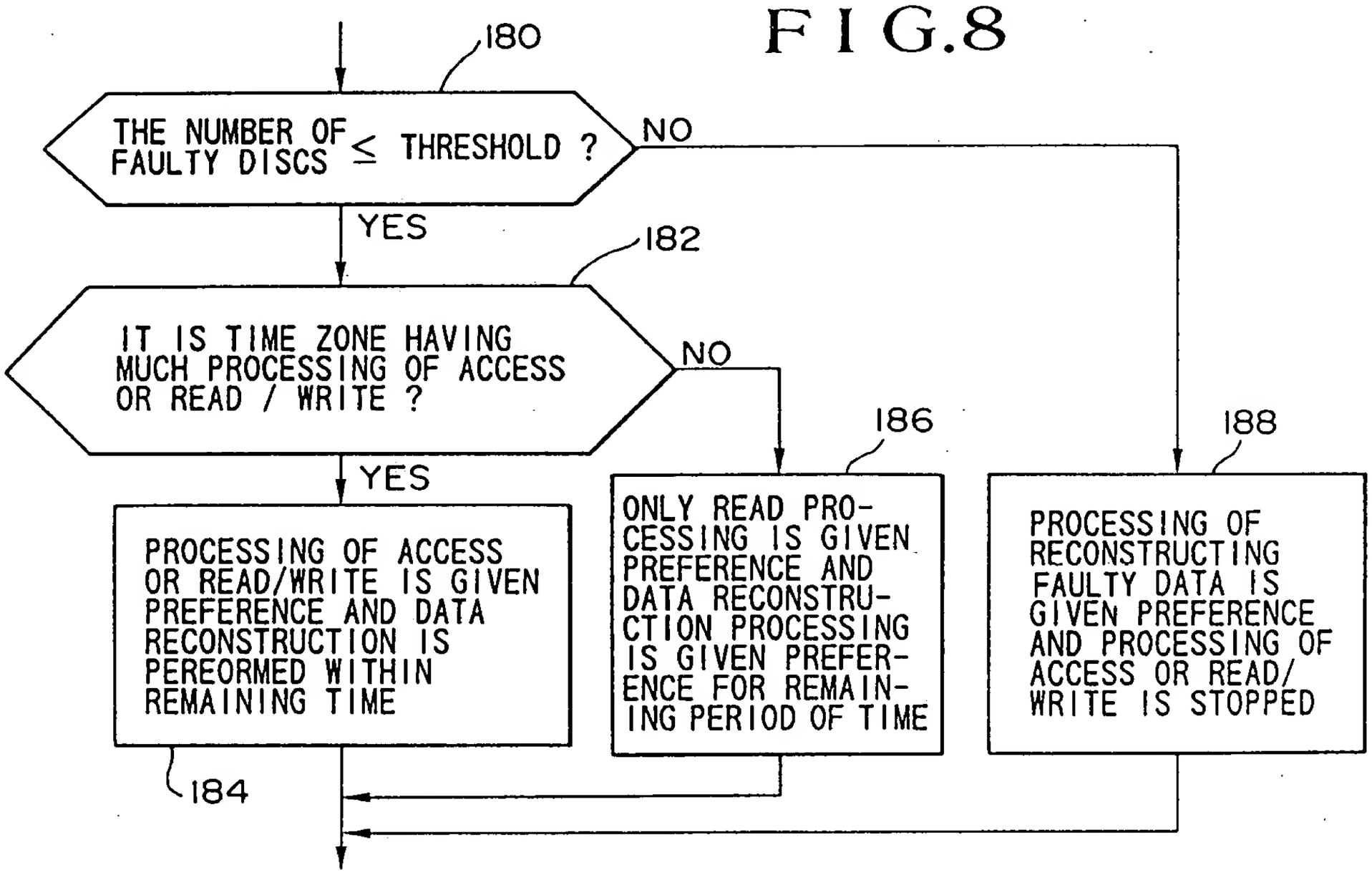
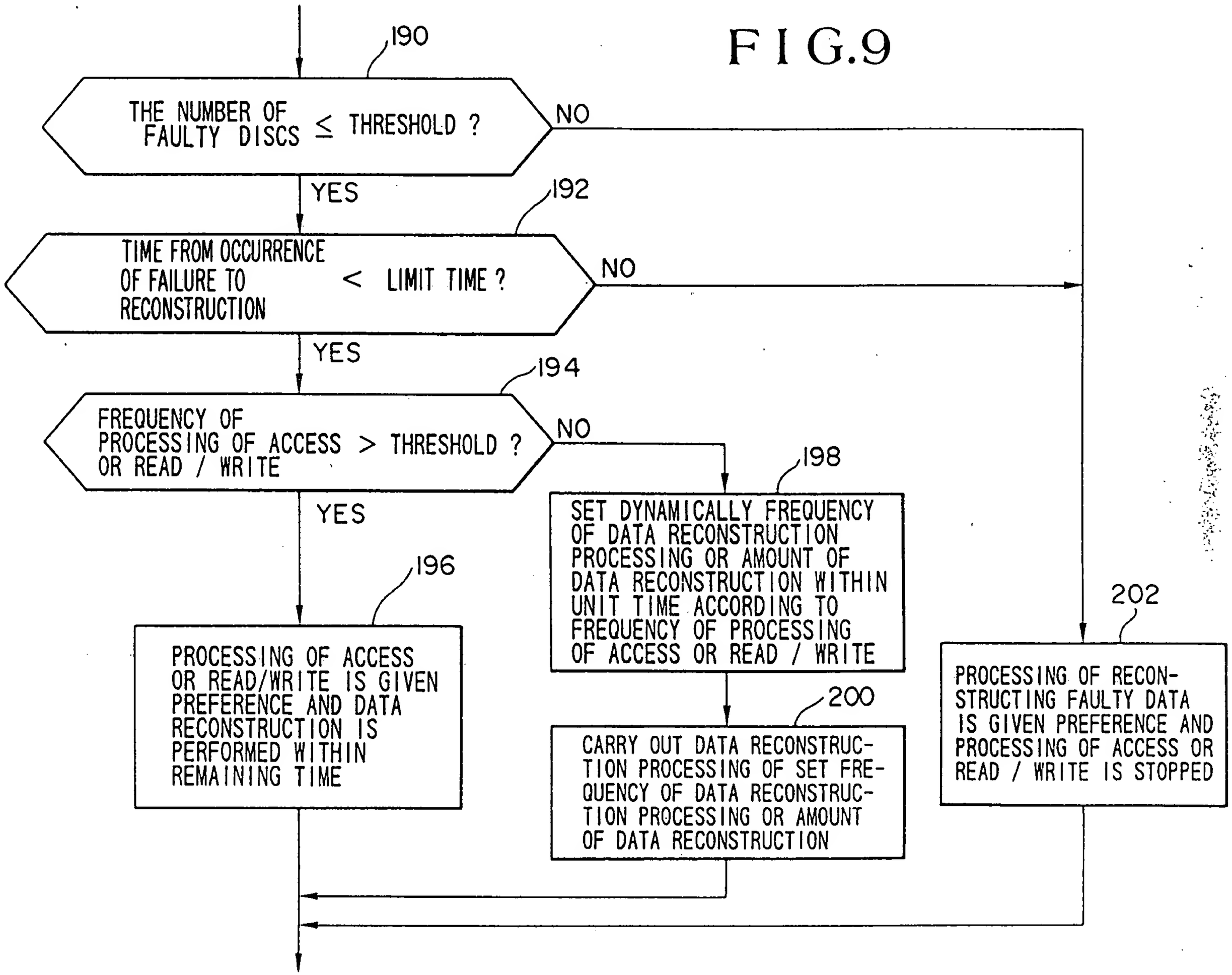

180
THE NUMBER OF FAULTY DISCS ≤ THRESHOLD ?
NO
YES
182
IT IS TIME ZONE HAVING MUCH PROCESSING OF ACCESS OR READ / WRITE ?
NO
YES
186
188
PROCESSING OF ACCESS OR READ/WRITE IS GIVEN PREFERENCE AND DATA RECONSTRUCTION IS PEREORMED WITHIN REMAINING TIME
ONLY READ PROCESSING IS GIVEN PREFERENCE AND DATA RECONSTRUCTION PROCESSING IS GIVEN PREFERENCE FOR REMAINING PERIOD OF TIME
PROCESSING OF RECONSTRUCTING FAULTY DATA IS GIVEN PREFERENCE AND PROCESSING OF ACCESS OR READ/ WRITE IS STOPPED
184

FIG.9


190
THE NUMBER OF FAULTY DISCS ≤ THRESHOLD ?
NO
YES
192
TIME FROM OCCURRENCE OF FAILURE TO RECONSTRUCTION < LIMIT TIME ?
NO
YES
194
FREQUENCY OF PROCESSING OF ACCESS OR READ / WRITE > THRESHOLD ?
NO
YES
198
SET DYNAMICALLY FREQUENCY OF DATA RECONSTRUCTION PROCESSING OR AMOUNT OF DATA RECONSTRUCTION WITHIN UNIT TIME ACCORDING TO FREQUENCY OF PROCESSING OF ACCESS OR READ / WRITE
196
PROCESSING OF ACCESS OR READ/WRITE IS GIVEN PREFERENCE AND DATA RECONSTRUCTION IS PERFORMED WITHIN REMAINING TIME
200
CARRY OUT DATA RECONSTRUCTION PROCESSING OF SET FREQUENCY OF DATA RECONSTRUCTION PROCESSING OR AMOUNT OF DATA RECONSTRUCTION
202
PROCESSING OF RECONSTRUCTING FAULTY DATA IS GIVEN PREFERENCE AND PROCESSING OF ACCESS OR READ / WRITE IS STOPPED